

**AICTE-ISTE INDUCTION/REFRESHER
PROGRAMMES – 2018-19**

ONE WEEK ONLINE INDUCTION/REFRESHER PROGRAMME On

“ELECTRIC HYBRID VEHICLE” PHASE-II

(01-03-2021 to 06-03-2021)



REPORT

AICTE -ISTE sponsored online Induction/Refresher Programme on “ELECTRIC HYBRID VEHICLE” Phase- II is organized by Department of Electrical and Electronics Engineering, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh, India during March 1st -06th, 2021.

The online Induction/Refresher Programme is conducted using the Google Meet platform. A total of 85 participants from 10 states of the country participated in the Programme. The participants are the faculty and research scholars of various engineering colleges and government institutions across the country. Further, the participants are trained by the industry and academic experts. The Induction/Refresher Programme has received an overwhelming response from the participants. A total of 18 sessions are conducted. Out of 18, 16 are technical sessions and one is on “stress management” to promote the FIT INDIA movement across the country.

Electric hybrid vehicles play a very prominent role in future days to reduce the greenhouse gases. The vehicle is lighter and roomier than pure electrical vehicle because it will carry fewer batteries than the pure electrical vehicles. They are more reliable, economical, and safe in operations. Electric hybrid vehicle design needs the knowledge in electrical, electronics, mechanical, instrumentation and computer engineering for the purpose of designing, quantitatively evaluating, predicting, measuring and improving vehicle technology. Hence the Programme is considered as interdisciplinary.

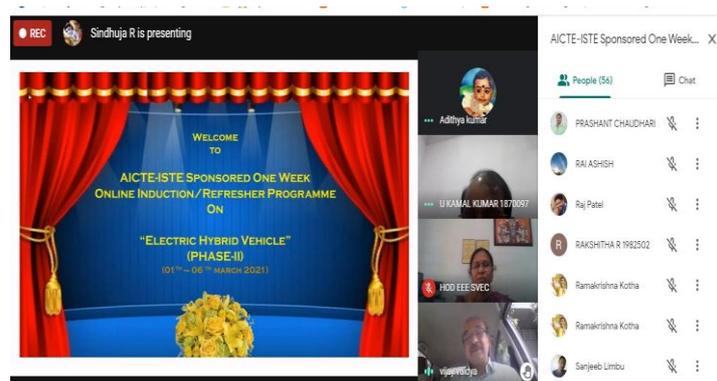
The outcomes of FDP are as follows:

- ❖ Acquire knowledge in hybrid electric vehicle technology.
- ❖ Motivates the faculty members to enhance research work in this area.
- ❖ Idealize different solutions to solve the same problem and evaluate (justifying) which one is the best with respect to its design quality.

- ❖ The programme also promotes a basic understanding of alternative fuel and HEV vehicle technology.

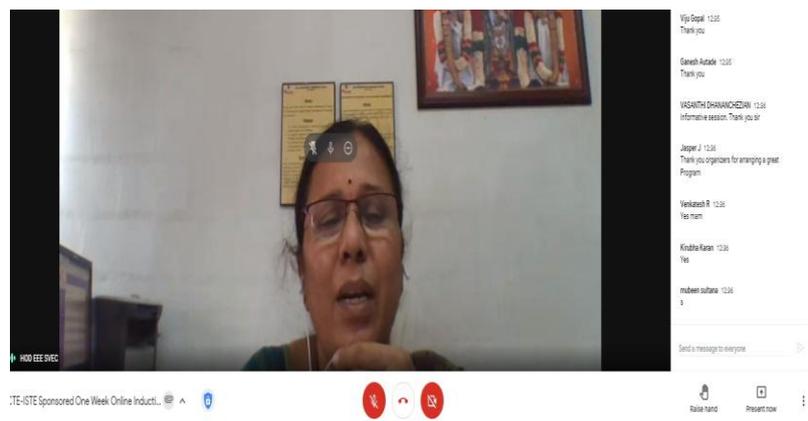
INAUGURAL SESSION

The inaugural function of the online FDP is scheduled on March 1, 2021 at 10:00 AM. In the inaugural function, Ms. R. Sindhuja, Assistant Professor, Department of EEE welcomed the chief guest **Prof. Vijay D. Vaidya**, Executive Secretary, ISTE and Guest of Honor **Prof. L. Venugopal Reddy**, Advisor cum Director, SVET and Principal, directors and vice- principal of SVEC and all participants. The event is started with a prayer song.



Ms. R. Sindhuja, Assistant Professor, Department of EEE is welcoming the chief guest and the participants.

Dr. M.S. Sujatha, Professor and Head, Department of EEE given the welcome speech. In the welcome speech, the Professor and Head, Department of EEE welcomed the chief guest, Guest of Honor, Directors and Principal & vice- principal, of SVEC and all participants and also thanked the ISTE and AICTE sponsored the FDP. Further, Professor and Head, Department of EEE highlighted the objectives of the FDP, the topics to be discussed, the outcomes of the FDP. Later, the coordinator of FDP **Dr. V.Arun**, Associate Professor, Department of EEE introduced the chief guests to the participants.



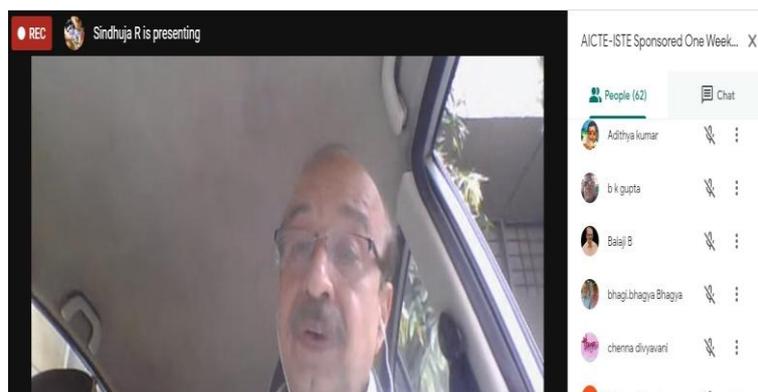
Dr. M. S. Sujatha, Professor & Head , Department of EEE is giving the welcome speech.



Dr. V. Arun, Coordinator, FDP is introducing the chief guest to the participants.



Chief Guest **Prof. Vijay D. Vaidya**, Executive Secretary, ISTE is inaugurating the event. **Prof. Vijay D. Vaidya**, Executive Secretary, ISTE has emphasized the skills that can gain by the participants after learning the Electric Hybrid Vehicle concepts and Prof. Vijay D. Vaidya appreciate the participants and faculties of sreevidyanikethan college to organize this FDP.



Chief Guest **Prof. Vijay D. Vaidya**, Executive Secretary, ISTE is addressing the participants.

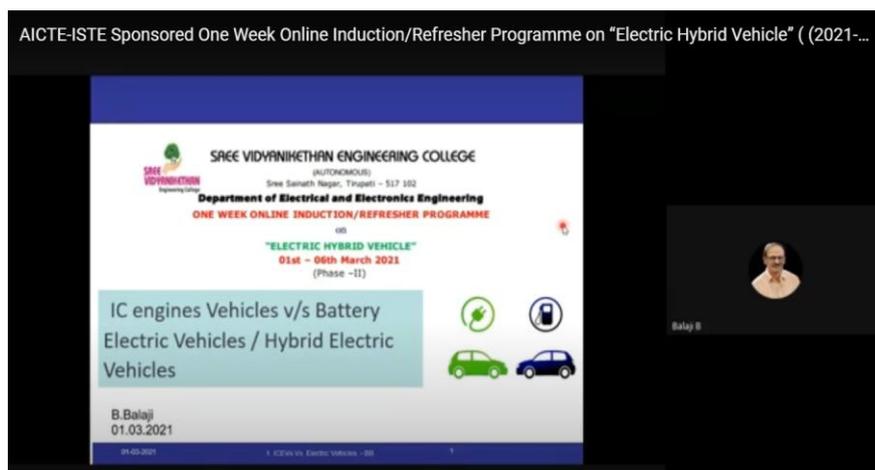
TECHNICAL SESSIONS

March 1, 2021 (Day – 1, Session – 2 & 3)

Er. B. Balaji, Rtd., General Manager – Product Development Ashok Leyland Ltd - Chennai, acted as a resource person for Second and Third session of Day-1 to deliver IC Engine vehicles Vs Battery / Hybrid Electric vehicles and Types of EVs – HEVs , BEVs , FCEVs and EV simulation-based developments

In this sessions. The participants were introduced with the following concepts.

- IC Engine vehicles Vs Battery / Hybrid Electric vehicles Why Electric vehicles (EVs)?
- Reason For The Shift To Clean Mobility
- Energy conversions in vehicle
- Subsystems of vehicles
- Hybrid Electric vehicles –Types
- Battery Electric vehicles
- Efficiency comparison of different types of vehicle
- EV simulation -tools
- Model based system simulation
- Battery performance analysis
- EV simulation application.



Er. B. Balaji, Rtd., General Manager – Product Development Ashok Leyland Ltd deliver lecture about IC Engine Vehicles va Battery Electric/Hybrid Electric Vehicles

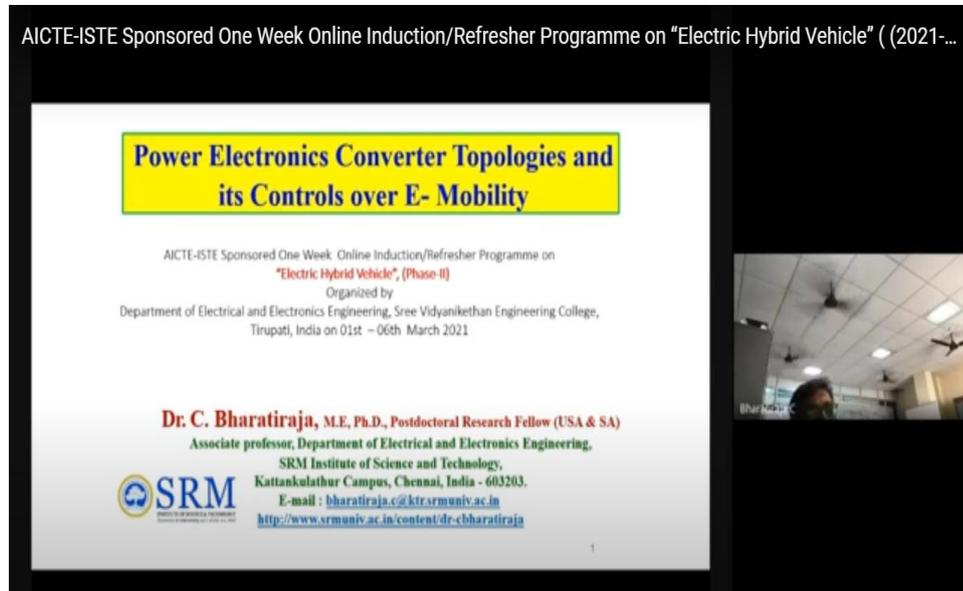
March 2, 2021 (Day – 2, Session – 1)

Dr. C. Bharatiraja , Associate professor, SRM institute of science and technology, Chennai acted as a resource person for all the three sessions of Day-2. The first session of Day-2 was started at 10:00 AM.

In this session **Dr. C. Bharatiraja** , explained the Power electronics converter

topologies and emobility and implementation. The participants have gained the practical knowledge on the following concepts.

- Converter and inverter topologies and control,
- EV motor drive
- MLI based Induction motor drive
- Different configuration of topologies

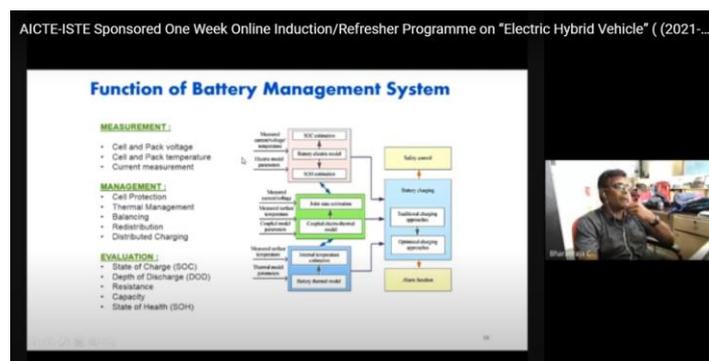


Dr. C.Bharatiraja is explaining Power electronic converter topologies and its control over E-Mobility/wireless charging concepts

March 2, 2021 (Day – 2, Session – 2)

The second session of the Day-2 was started at 12.30 AM. In this session, **Dr. C.Bharatiraja** has demonstrated the following concepts.

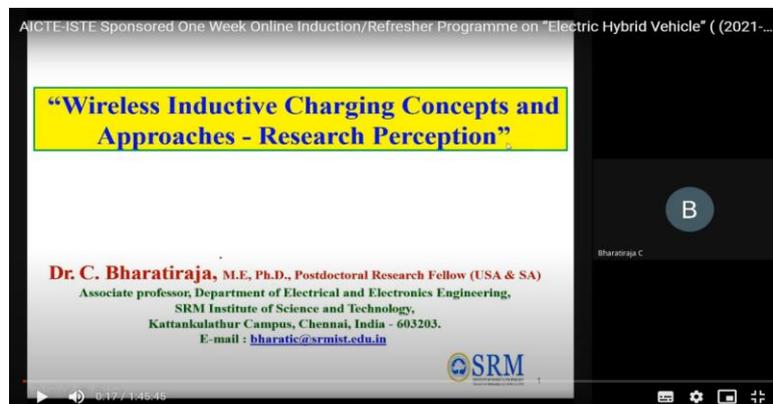
- E mobility
- Batteries
- Battery management systems
- Charging of EVs and charger
- Bidirectional charger
- Charging methods



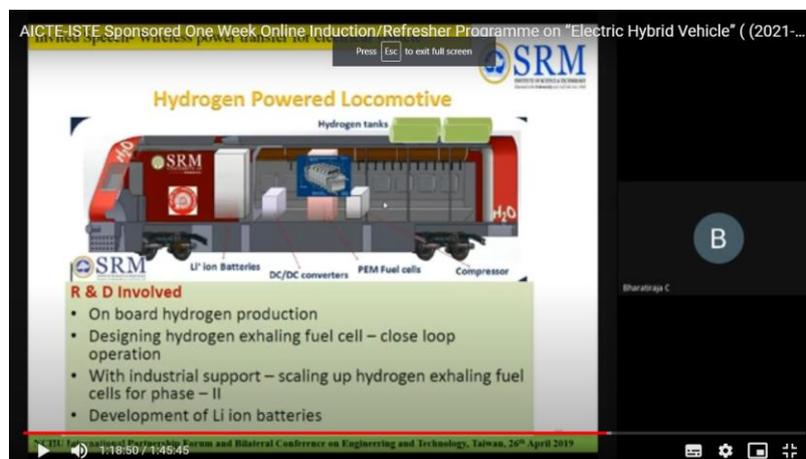
Dr. C.Bharatiraja is explaining BMS

March 2, 2021 (Day – 2, Session – 3)

The session was started at 2.30 PM. In this session, **Dr. C.Bharatiraja** has delivered a lecture on PV plants with micro grid concepts, smart city and roll of power converters. He explained the various tags and styles that are used to design micro grid and smart grid. In addition, **Dr. C.Bharatiraja** practically shown the design of wireless charger for EV that help the participants to gain practical knowledge on EV and Charger.



Dr. C.Bharatiraja is explaining smart city.



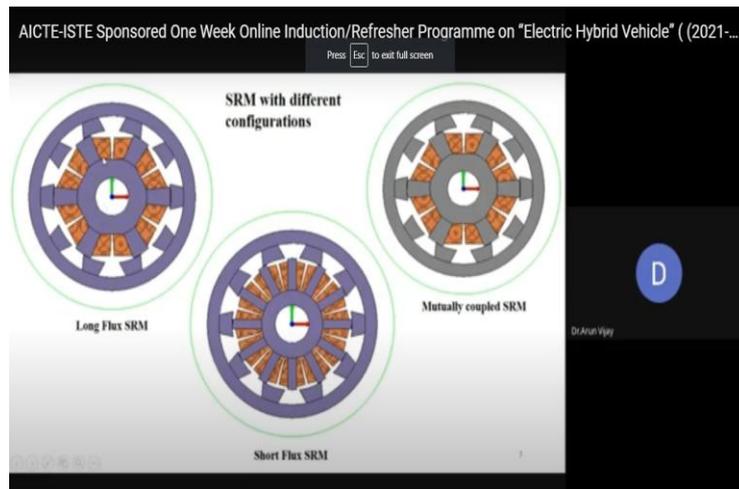
Dr. C.Bharatiraja is demonstrating model of hydrogen powered locomotive

March 10, 2021 (Day – 3, Session – 1)

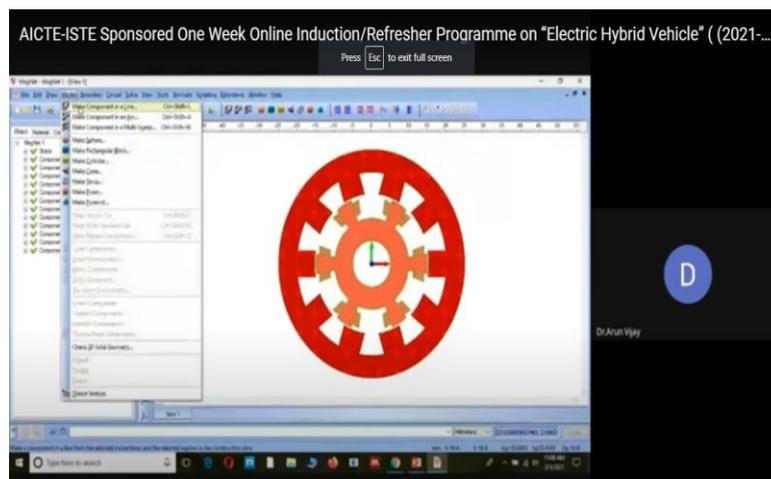
All the session of the Day-3 was handed by **Dr.S.Prabhu**, Associate professor, Sreevidyanikethan Engineering College.

In this session Dr.S.Prabhu, explained Design of switched reluctance motor for electric vehicles. The participants have gained the knowledge on the following concepts.

- Electromagnetic analysis for SRM
- Lamination material selection
- Design using magnet software



Dr. S. Prabhu is explaining about SRM Motors with different configuration.

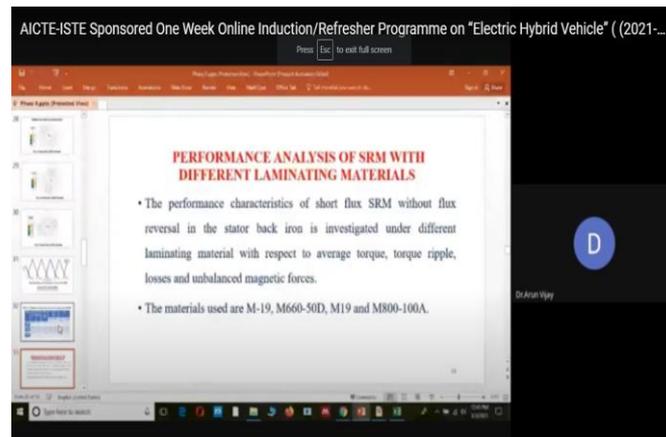


Dr. S. Prabhu is demonstrating motor design.

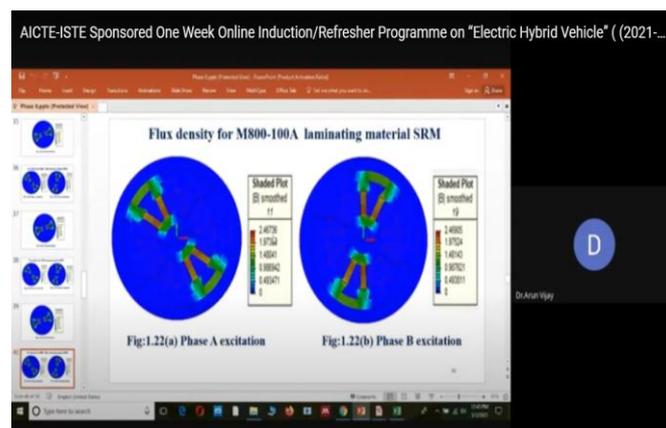
March 3, 2021 (Day – 3, Session – 2)

The second session of the Day-3 was started at 12.30 AM. In this session, **Dr. S.Prabhu** has demonstrated the following concepts.

- Torque analysis
- Torque speed characteristics analysis
- Power circuit
- Laminating materials
- Performance analysis with different lamination materials
- Flux density of different laminating materials
- Vibration analysis



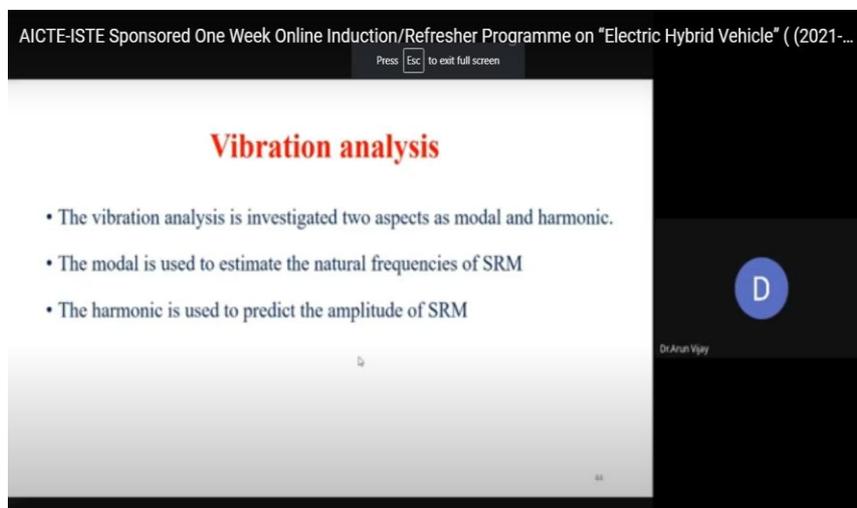
Dr. S. Prabhu is Explaining performance analysis of SRM



Dr. S. Prabhu is demonstrating flux density with software.

March 3, 2021 (Day – 3, Session – 3)

The session was started at 2.30 PM. In this session, **Dr. S.Prabhu** has delivered a lecture on vibration analysis of SRM, **Dr. S.Prabhu** practically shown the design of and analysis of SRM using different softwares.



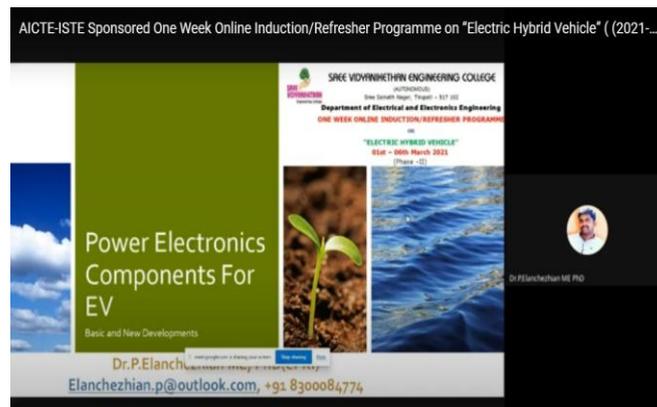
Dr. S. Prabhu is Explaining vibration analysis of SRM

March 4, 2021 (Day – 4, Session – 1)

The first session of the Day-4 was started at 10.00 AM. In this session, **Dr. P. Elanchezhan**, Technical Lead (Global R & D), KK Wind Solutions India Private Limited, Bangalore, India. Acted as a resource person for first two session.

He delivered a session on Power Electronic components for EV. In this session, the participants have gained the knowledge on the following:

- Critical components of EV Power conversion unit.
- Driver circuit design
- Protection circuits
- PWM and dead time
- SiC Mosfet
- IGBT



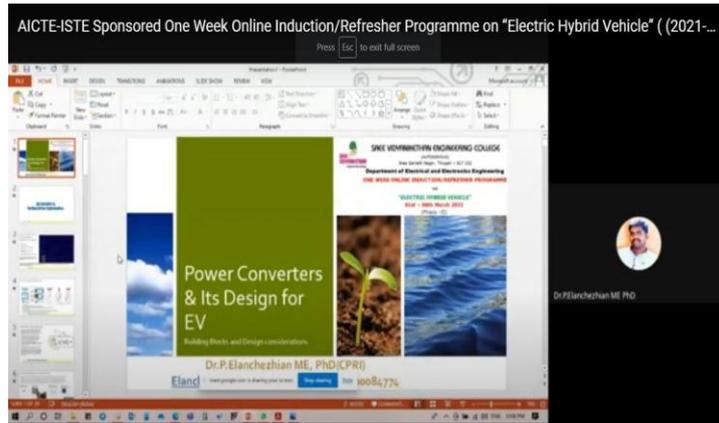
Dr. P. Elanchezhan, explaining power electronic components for EV to the participants.

March 4, 2021 (Day – 4, Session – 2)

The session 2 of the Day-4 was started at 12:00 Noon. **Dr. P. Elanchezhan**, Technical Lead (Global R & D), KK Wind Solutions India Private Limited, Bangalore, India. Acted as a resource person for the session. He delivered a session on " Power converters and its design for EV.

In this session, the participants have gained the partial knowledge on the following:

- Power converters.
- Selection of components
- Gate driver optimization
- Power converter DC/DC.
- Design of boost converter using Multisim
- Simulation tools for design
- Simulation Analysis.



Dr. P. Elanchezhan, explaining power converters and its design for EV to the participants.

March 4, 2021 (Day – 4, Session – 3)

The third session of Day-4 was started at 2.30 Noon. As a part of FIT INDIA movement and to promote it across the country, the session on “**Creative Thinking for Stress Management**” is conducted. This session was delivered by **Sri Bandana rai**, Founder and Chief mentor, Ananya Tec. **Dr. V. Arun**, Coordinator of ATAL FDP introduced the resource person to the participants.

Sri Bandana rai explained the following:

- Under standing stress
- Causes of stress
- Stress management
- Strategies of emotional intelligence include self-awareness, self-management, social awarness and relationship management.
- Positive and negative emotions.
- Brainstroming
- Creative thinking
- Power to Empower



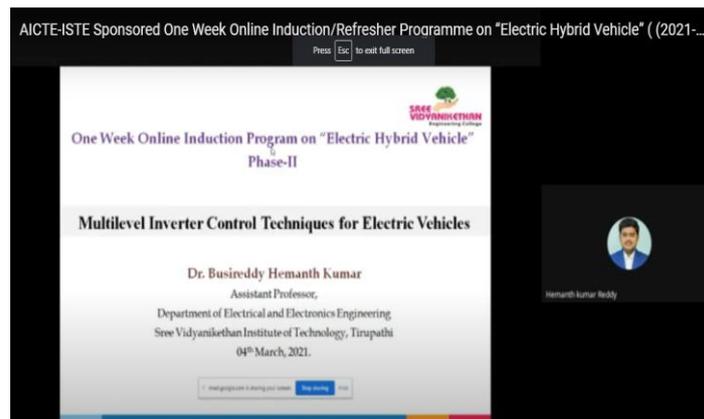
Sri Bandana rai is explaining Stress with example

March 5, 2021 (Day – 5, Session – 1)

Dr.B.Hemanth kumar, Assiant Professor, Sreevidyanikethan Engineering college acted as a resource person for all the three sessions of Day-5. The first session of Day-5 was started at 10:00 AM.

The topics that are discussed in this session are:

- Multilevel inverter control techniques for EV
- Multilevel inverter topologies
- Switching techniques
- Various SPWM techniques
- Nearest level control

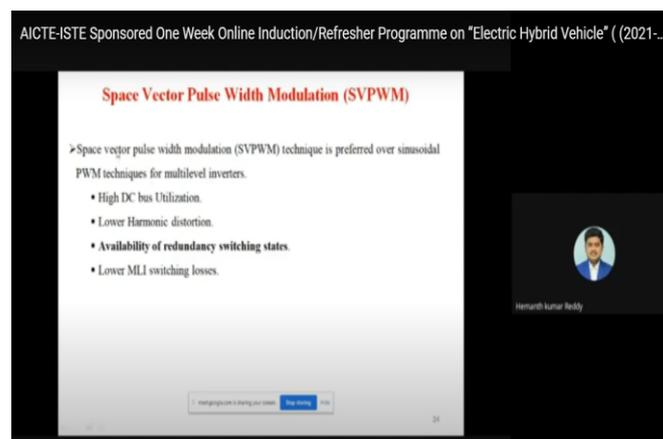


Dr.B.Hemanth kumar, is explaining Multilevel inverter control techniques for EV

March 5, 2021 (Day – 5, Session – 2)

The second session of Day-5 was started at 12.00 Noon. **Dr.B.Hemanth kumar**, explained the following to the participants.:

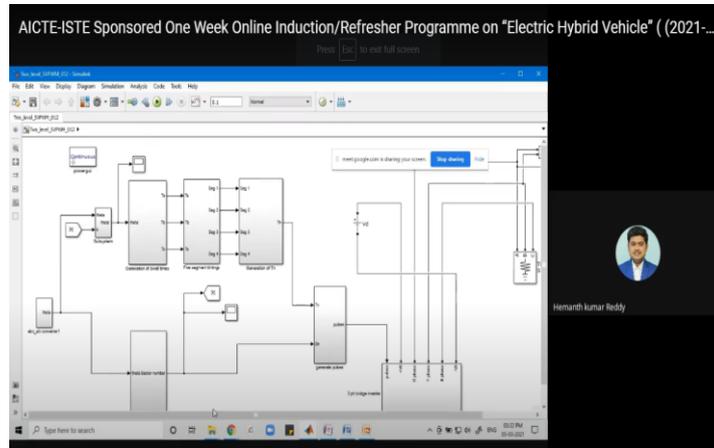
- Space vector PWM techniques
- SVPWM for Multilevel inverter
- Selection of vectors
- Dwell time calculations
- Switching states



Dr.B.Hemanth kumar, is explaining SVPWM switching techniques

March 5, 2021 (Day – 5, Session – 3)

The session was started at 2.30 PM. In this session, **Dr.B.Hemanth kumar**, has delivered a hands lecture of matlab simulation of Controls of various multilevel inverters for EV. **Dr.B.Hemanth kumar**, practically shown the design of multilevel inverters and control techniques



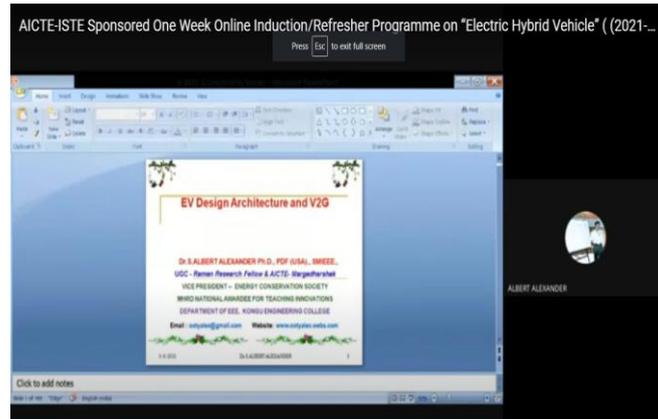
Dr.B.Hemanth kumar, is demonstrate nine level inverter using MATLAB

March 6, 2021 (Day – 6, Session – 1)

Dr. S. Albert Alexander, Postdoctoral research fellow (USA) ,Associate Professor of EEE Kongu Engineering College Tamilnadu acted as a resource person for two sessions of Day-6 to deliver EV design Architecture and V2G. The first session of Day-6 was started at 10:00 AM.

In this session, the participants have gained the partial knowledge on the following:

- EV Architecture
- Types of EV
- Control of EV
- Charging mechanism
- BMS
- Battery modelling
- Selection of motors for EV
- Power supply design for hypersonic
- EV application
- Calculation of SoC, SoH, DoD
- Grid integration of renewable energy sources.



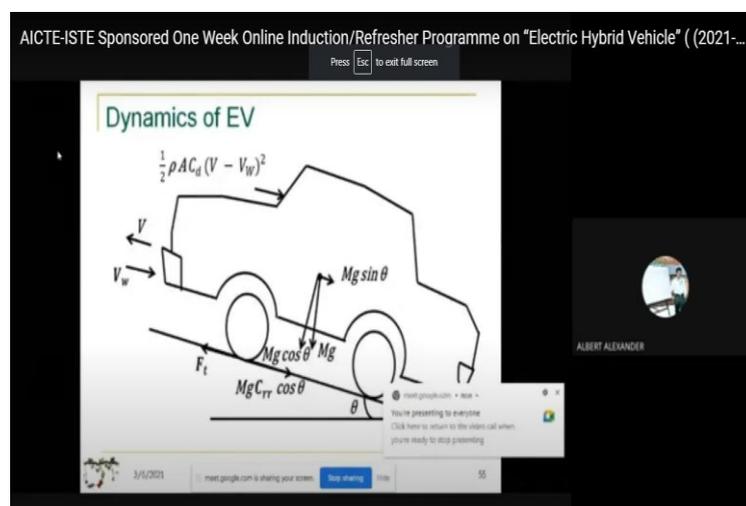
Dr. S. Albert Alexander, is explaining the applications of Power electronics.

March 6, 2021 (Day – 6, Session – 2)

The session 2 of the Day-6 was started at 12:00 AM. In this session, the participants have introduced the concepts of V2G and dynamics of vehicle.

The topics that are discussed in this session are:

- Vehicle dynamics
- Cruise and acceleration
- Ascent and Reentry vehicles
- HEV objective
- V2G
- Benefits of V2G
- Challenges in V2G
- Architecture of V2G
- Batteries used in EV.



Dr. S. Albert Alexander, is explaining the concepts of Dynamics of EV

VALEDICTORY FUNCTION

March 13, 2021 (Day – 5, Session – 3)

The valedictory function of online Faculty Development Programme (FDP) on "ELECTRIC HYBRID VEHICLE" was started at 2.00 PM on March 13, 2021. In the valedictory function, **Dr. T. Nageswara Prasad**, Vice - principal and **Dr. S. Albert Alexander**, are invited as chief guest.



Dr. T. Nageswara Prasad, is addressing to the participants



Dr. V. Arun, Coordinator, has proposed a Vote-of-Thanks.

Initially, the coordinator thanked the Core team of AICTE and ISTE for sponsoring the FDP to organize at national level and also for their suggestions, support and guidance to conduct the FDP. Later, he thanked the participants of various engineering colleges and government institutions across the country for their enthusiastic participation. At the end, he conveyed his heartfelt thanks to the management, Sree Vidyanikethan Engineering College (Autonomous), Tirupati, Andhra Pradesh, the Principal, Head of the Department, EEE, Dr. S.Prabhu, Co-coordinator for their constant support to make this event a grand success.

V.ARUN

Coordinator

Department of EEE

Sree Vidyanikethan Engineering College (Autonomous)
Tirupati – 517102, Andhra Pradesh